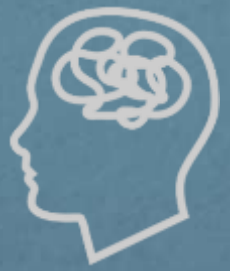
What is Successful Communication of Scientific Findings?

Professor Kristy Martire



Categorical conclusion

"…Suspect X's left shoe made the impression…"

Random-match probability

"…there is 1 chance in 1,000 of observing the evidence using a different shoe…"

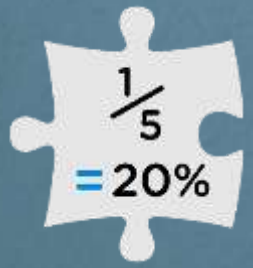
Verbal label

"…there is strong support for the proposition that Suspect X's left shoe made the impression…"

Likelihood ratio

"…the observed evidence is 1000 times more likely if Suspect X's left shoe made the impression…"

Bali, Martire, & Edmond, 2021; Martire, 2018; Martire & Edmond, 2020; National Research Council, 2009; Thompson, Grady, Lai, & Stern, 2018;
Icons created by Priyanka, Annamarie Kosto, Toli for Noun Project

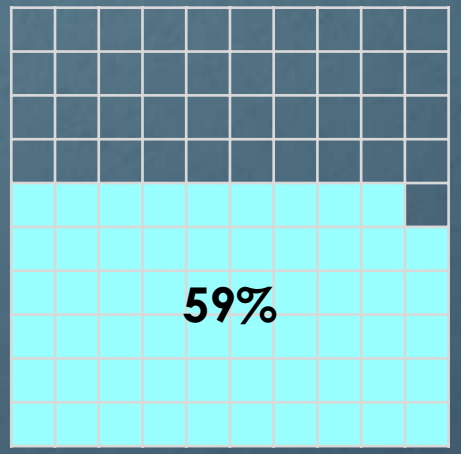


CONSISTENCY

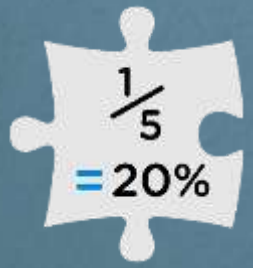
To give equal weight to evidence of equal strength

"1 in 1 million" Vs "0.0001%"

Lindsey, Hertwig & Gigerenzer, 2003



Bali et al., 2021



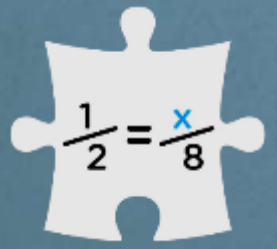
CONSISTENCY

To give equal weight to evidence of equal strength

Evidence that mathematical equivalence often does not guarantee psychological equivalence.

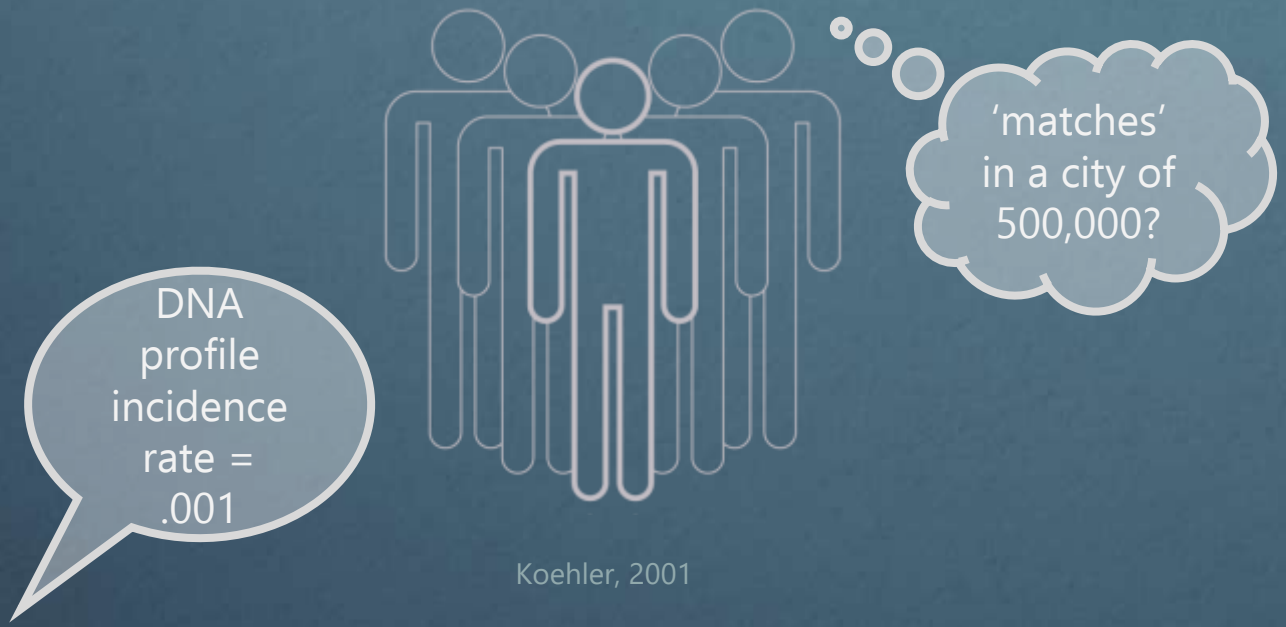
Martire & Edmond, 2020

Goodman, 1992
Lindsey et al, 2003
Koehler, 1996
Koehler, 2001
Martire et al, 2013
Martire et al, 2014
McQuiston-Surrett & Saks, 2009
Nance & Morris, 2002
Nance & Morris, 2005
Thompson & Schuman, 1987
Thompson & Newman, 2015
Wells, 1992

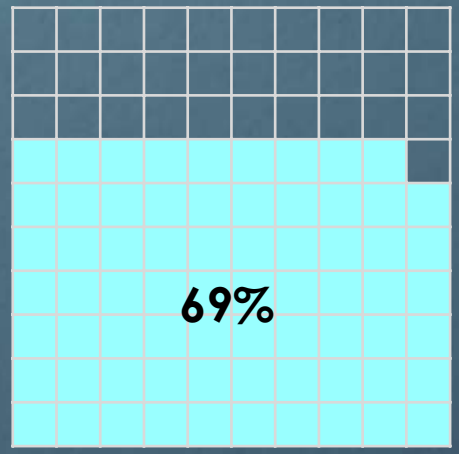


ABILITY

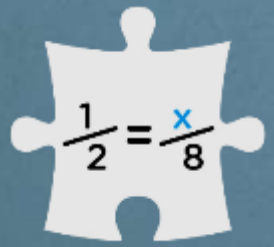
To be able to infer new information from the evidence



Koehler, 2001



Bali et al., 2021



ABILITY

To be able to infer new information from the evidence

Evidence is limited and inconsistent

Goodman, 1992
Lindsey et al, 2003
Kaye et al, 2007
Koehler, 2001
McQuiston-Surrett & Saks, 2009

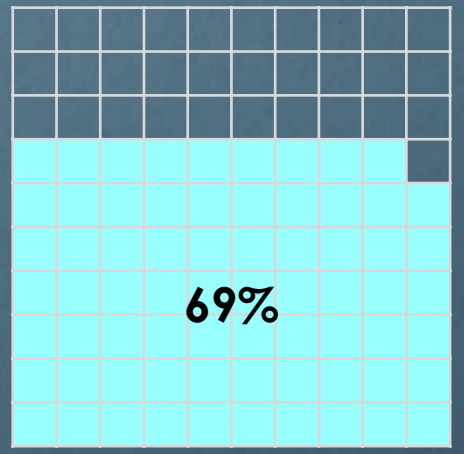
Martire & Edmond, 2020

SENSITIVITY

To give more/less weight to evidence of greater/lesser strength

"5.5 times more likely" Vs "5500 times more likely"

Martire, Kemp, Sayle & Newell, 2014



Bali et al., 2021

SENSITIVITY

To give more/less weight to evidence of greater/lesser strength

Evidence of broad (rather than precise) sensitivity to evidence strength

Martire & Edmond, 2020

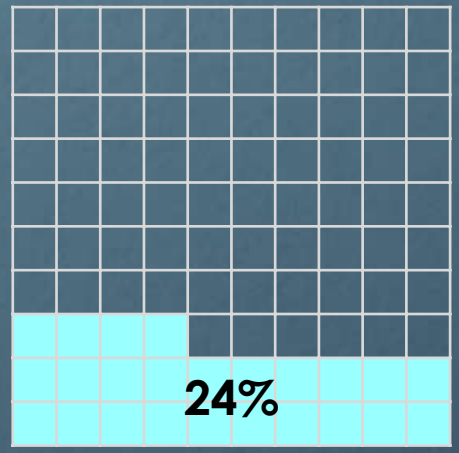
De Keijser et al, 2016
Faigman & Baglioni, 1988
Goodman, 1992
Kaasa et al, 2007
Koehler, 1996
Koehler, 2001
Martire et al 2013
Martire et al 2014
Nance & Morris, 2002
Nance & Morris, 2005
Scurich & John, 2013
Smith et al, 1996
Thompson et al, 2013
Thompson & Newman, 2015

ORTHODOXY

To update beliefs in line with (Bayesian) normative expectations

$$P(H|E) = \frac{P(H) \times P(E|H)}{P(E)}$$

Bayes Theorem



Bali et al., 2021

ORTHODOXY

To update beliefs in line with (Bayesian) normative expectations

Evidence is mixed

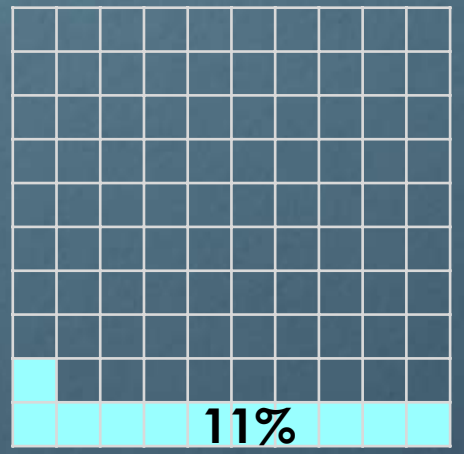
Martire & Edmond, 2020

Goodman, 1992
Martire et al, 2013
Martire et al, 2014
Nance & Morris, 2002
Nance & Morris, 2005
Schklar & Diamond, 1999
Smith et al, 1996
Thompson & Schuman, 1987
Thompson et al, 2013
Thompson & Newman, 2015

COHERENCE

To treat evidence in a logical and rational manner

Thompson & Newman, 2015



Bali et al., 2021

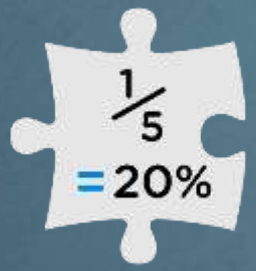
COHERENCE

To treat evidence in a logical and rational manner

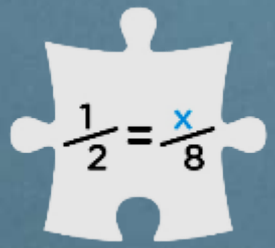
Clear evidence of aggregation errors and fallacious reasoning (e.g., defense attorney's fallacy)

Martire & Edmond, 2020

Goodman, 1992
Kaye et al, 2007
Koehler et al, 1995
Martire et al, 2013
Martire et al, 2014
Nance & Morris, 2002
Nance & Morris, 2005
Schklar & Diamond, 1999
Smith et al, 1996
Thompson & Schuman, 1987
Thompson et al, 2013
Thompson & Newman, 2015



Consistency

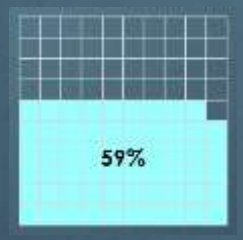


Ability

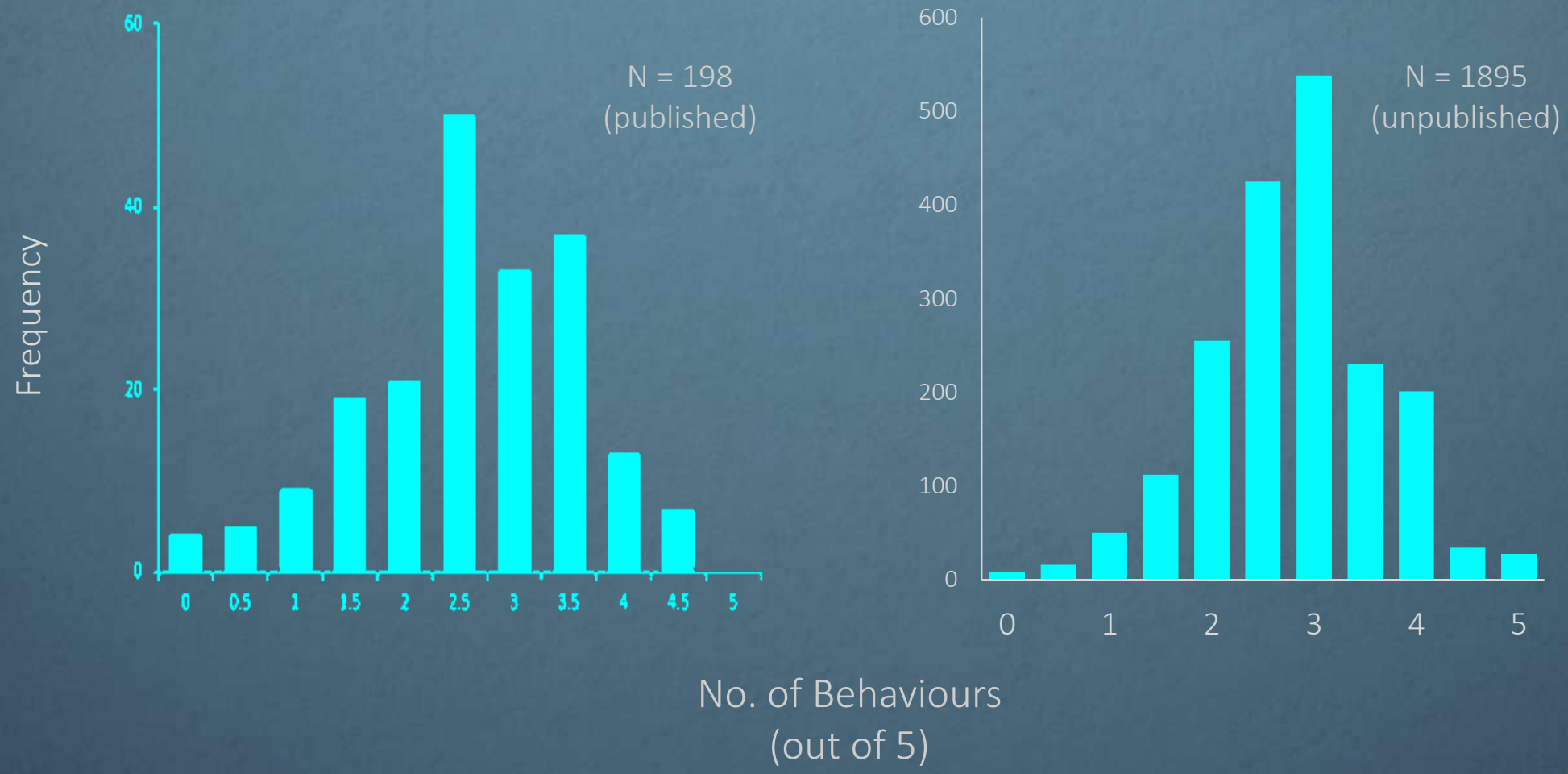
Sensitivity

Orthodoxy

Coherence



Is this what successful communication of scientific findings looks like?



Bali et al., 2021, Bali Thesis

	Consistency	Ability	Sensitivity	Orthodoxy	Coherence
Random Match Probability					
Likelihood Ratio					
Verbal Label					

Bali et al., 2021

Qualifications

Evidence of training, study or certification directly relevant to the opinion

Qualifications

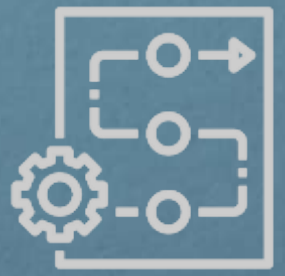
Proficiency

Proven track record of completing competent analyses and accurate opinions

Summersby, Edmond, Kemp, Ballantyne & Martire, 2024; Icons by Saeful Muslim, dDara, Nithinan Tatah, Victoruler, Gregor Cresnar, Eucalyp, mikicon for Noun Project

Qualifications

Proficiency



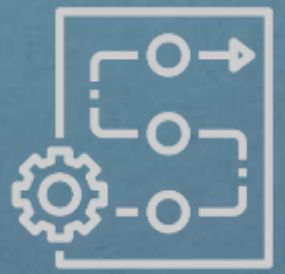
Procedure

What analyses were completed and in what way

Summersby, Edmond, Kemp, Ballantyne & Martire, 2024; Icons by Saeful Muslim, dDara, Nithinan Tatah, Victoruler, Gregor Cresnar, Eucalyp, mikicon for Noun Project

Qualifications

Proficiency



Procedure

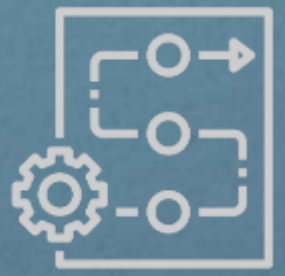
Assumptions

What did/does the practitioner assume to be true when forming their opinion

Summersby, Edmond, Kemp, Ballantyne & Martire, 2024; Icons by Saeful Muslim, dDara, Nithinan Tatah, Victoruler, Gregor Cresnar, Eucalyp, mikicon for Noun Project

Qualifications

Proficiency



Procedure

Assumptions

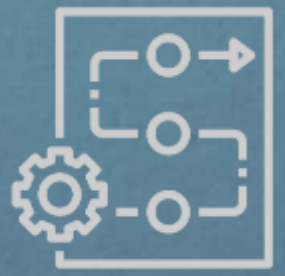
Validity

Evidence of the accuracy and reliability of the methods and procedures used

Summersby, Edmond, Kemp, Ballantyne & Martire, 2024; Icons by Saeful Muslim, dDara, Nithinan Tatah, Victoruler, Gregor Cresnar, Eucalyp, mikicon for Noun Project

Qualifications

Proficiency



Procedure

Assumptions

Validity

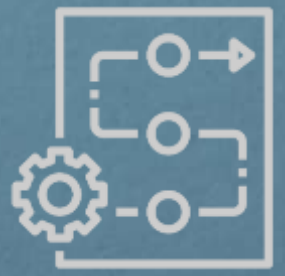
Human Factors

Information about who knew what when and how any potential for bias was managed

Summersby, Edmond, Kemp, Ballantyne & Martire, 2024; Icons by Saeful Muslim, dDara, Nithinan Tatah, Victoruler, Gregor Cresnar, Eucalyp, mikicon for Noun Project

Qualifications

Proficiency



Procedure

Assumptions

Validity

Human Factors

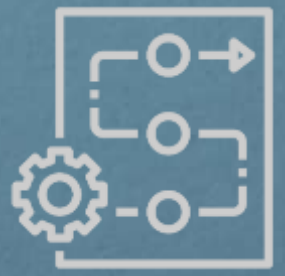
Limitations

Disclosures about evidence quality, contamination, non-conformities, peer disagreement etc.

Summersby, Edmond, Kemp, Ballantyne & Martire, 2024; Icons by Saeful Muslim, dDara, Nithinan Tatah, Victoruler, Gregor Cresnar, Eucalyp, mikicon for Noun Project

Qualifications

Proficiency



Procedure

Assumptions

Validity

Human Factors

Limitations

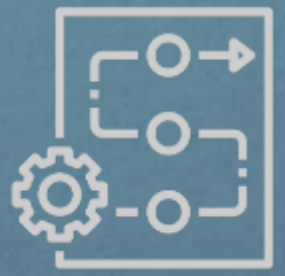
Conflict

Information about significant controversy's or disagreements relevant to the opinions provided

Summersby, Edmond, Kemp, Ballantyne & Martire, 2024; Icons by Saeful Muslim, dDara, Nithinan Tatah, Victoruler, Gregor Cresnar, Eucalyp, mikicon for Noun Project

Qualifications

Proficiency



Procedure

Assumptions

Validity

Human Factors

Limitations

Conflict

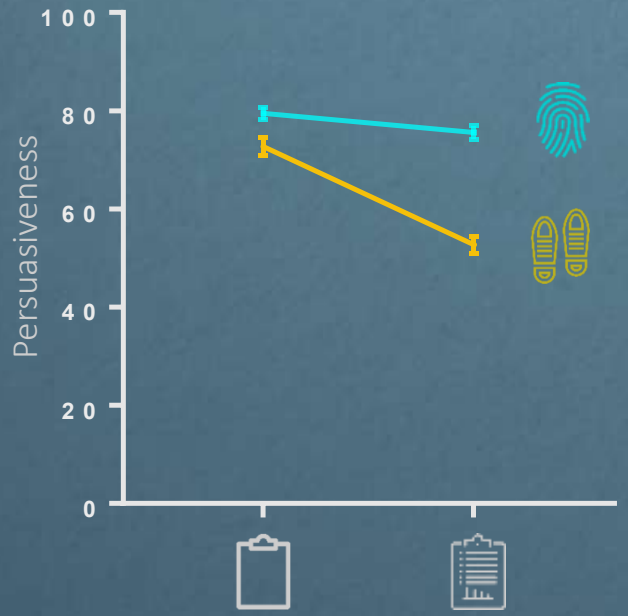
Summersby, Edmond, Kemp, Ballantyne & Martire, 2024; Icons by Saeful Muslim, dDara, Nithinan Tatah, Victoruler, Gregor Cresnar, Eucalyp, mikicon for Noun Project

"Only two properly designed studies…have been conducted…found false positive rates… that could be as high as 1 in 306 in one study and 1 in 18 in the other study."

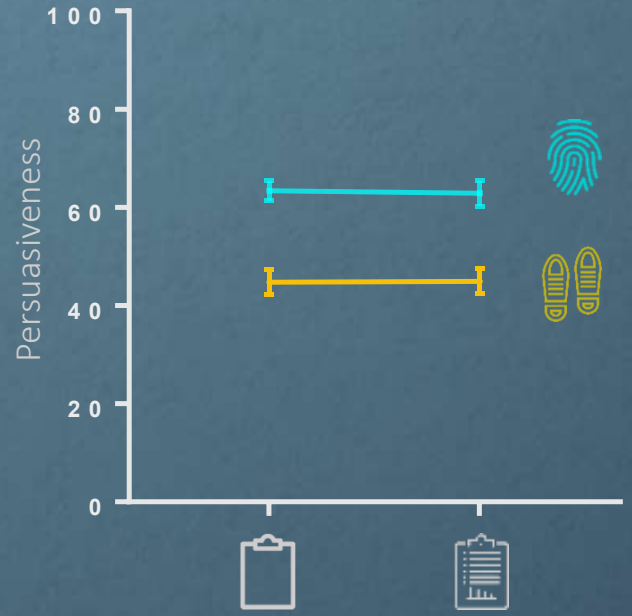
"No properly designed studies… have been conducted, so we cannot give an accurate estimate of error rates."

Edmond et al., 2017; PCAST, 2016

N = 566



N = 240



Summersby et al *in prep*; Icons by mikicon, yoyon Pujiyono, Luis Prado, prakruti, icon 54, eucalypt, Creative Stall for Noun Project

What would it look like for someone to genuinely understand my scientific findings?

Thank you

k.martire@unsw.edu.au

Please share your feedback about this talk https://goo.gl/EUiOE9

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